

REMARKS

Claims 1-47 were originally pending; however, after entry of this amendment, claims 1-7 and 10-94 are pending in the present application.

Claims 1-47 are presently rejected.

Claim Objections

Claims 1 and 32 are objected to because of the following informalities: In claims 1 and 32, Applicant discloses “and/or a second beam” but the further limitations in the claim include the second beam, therefore the “and/or” should be changed to “and” for proper clarification.

This has been done and new claims 48-94 have been added to more adequately cover the invention in light of this amendment.

Claim Rejections under 35 USC 102

Claims 1-3, 6-7, 9-11, 14-17, 19, 23-26, 28, 30-31 are rejected under 35 USC 102(e) as being anticipated by Vaez-Iravani et al., USP 6,538,730.

Claim Rejections under 35 USC 103

Claims 4-5, 12-13 are rejected under 35 USC 103(a) as being unpatentable over Vaez-Iravani et al., USP 6,538,730 in view of Marxer et al., USP 6,271,916.

Claims 8, 18, 20-22, 27, 29 are rejected under 35 USC 103(a) as being unpatentable over Vaez-Iravani et al., USP 6,538,730.

Claims 1 – 3, 6 – 7, 9 – 11, 14 – 17, 19, 23 – 26, 28, 30 and 31 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,538,730. The rejection is respectfully traversed.

The Examiner is of the opinion that the ‘730 patent discloses an optical configuration where radiation scattered by a surface illuminated by a first and second beam and scattered at different azimuthal angles with respect to a line normal to the surface is directed to different

devices without employing a common collecting instrument, referring to Fig. 3A, column 6, lines 38 – 61 and column 9, lines 26 – 41. We believe that the '730 patent does not teach such feature. Thus, as clearly stated in column 6, lines 38 – 42 of the '730 patent, the arrangement of multiple fiber channels receiving radiation in FIG. 3A actually receives radiation in the convergent cone of radiation shown in FIG. 2, such as that collected by mirror 52. In other words, mirror 52 is the common collecting instrument that directs radiation scattered by spot 20a of wafer 20 and directs such radiation across the multiple fiber channels 72 shown in FIG. 3A. As explained in column 7, lines 8 – 14, radiation directed to multiple fiber channels or detectors 80 or 82 is collected by a common collector lens 38 from the illuminated spot on the surface of wafer 20. Thus, contrary to the opinion of the Examiner, the '730 patent fails to disclose an optical configuration where radiation scattered by the surface is directed to optical devices disposed at different azimuthal angles with respect to a line normal to the surface without employing a common collecting instrument.

The '730 patent issues from U.S. Patent Application Serial No. 09/828,269, which is discussed in paragraph [0008] of the present application. As pointed out in paragraph [0008] of the present application, the '730 patent describes a defect detection system employing a collector that comprises a curved mirror such as an ellipsoidal mirror. As also pointed out in paragraph [0008], while such a system (i.e. one using a common collector mirror) is versatile and desirable for many applications, there may be applications where the use of such curved mirrors may be too expensive or impractical, such as where it is desirable for the defect detection system to be very small. As for such applications, the apparatus of claim 1 is advantageous over that in the '730 patent.

It is believed to be well settled that in order for a reference to anticipate a claim, there must be identical elements between those of the reference and those of the claim. Since the '730 patent lacks the above feature discussed (namely, that radiation scattered by the inspector surface is directed towards optical devices dispersed at different azimuthal angles with respect to a line normal to the surface without employing a common collecting instrument), the '730 patent fails to anticipate claim 1.

Furthermore, collector 40 does not appear to be in the double dark field arrangement relative to the second beam 24, nor is it clear that the PMT 40 has an aperture larger than that of any of the optical devices collecting radiation scattered by the surface referred to in column 5,

lines 42 – 52. The double dark field arrangement is defined in paragraph [0027] of the present application.

Claims 2, 3, 6, 7, 9 – 11, 14 – 17, 19, 23 – 26, 28, 30 and 31 are believed to be allowable since they depend from allowable claim 1. They are further believed to be allowable on account of limitations in these claims. Thus, claim 11 adds the limitation that the optical fibers to which scattered radiation is directed are multi-mode. This is not disclosed in FIG. 3A of the '730 patent, contrary to the opinion of the Examiner, and the Examiner has failed to indicate how FIG. 3A discloses such feature.

Claim 19 adds the feature that the source of claim 1 is comprised of one or more radiation emitting elements supplying the first and second beams. The references to 22 and 24 in FIG. 1 by the Examiner fail to teach or suggest such feature. The numerals 22 and 24 refer to two different optical beams (which can be emitted by the same element insofar as the illustration in Fig. 1 is concerned) and not to any radiation emitting elements.

Claim 28 adds the feature that the apparatus comprises a compact optical head. Reference 10 is not shown in FIG. 5A relied on by the Examiner to reject this claim. There is no indication that the entire apparatus in FIG. 5A of the '730 patent is compact at all.

Claims 4, 5, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '730 patent in view of U.S. Patent 6,271,916 to Marxer et al. The rejection is respectfully traversed.

Claims 4, 5, 12 and 13 all depend from claim 1. Since Marxer also fails to remedy the deficiencies pointed out above in regard to the '730 patent, Marxer, either alone or in combination with the '730 patent, also fails to teach or suggest claim 1. Claims 4, 5, 12 and 13 are therefore allowable since they depend from allowable claim 1. These claims are further believed to be allowable on account of the limitations in these claims. Thus, claim 12 adds the limitation that the aperture of the at least one collector substantially in a double dark field arrangement relative to the second beam subtends an angle of about 20° to 60° at the illuminated spots by the second beam. Claim 13 adds the limitation that the aperture of such at least one collector subtends an angle of about 40° to 60° from the spot. These features are clearly not taught or suggested by Marxer et al. The Examiner has failed to point out which section of Marxer discloses such feature. In fact, Marxer appears to fail to disclose any double dark field

arrangement at all. The 20° to 60° or 40° to 60° of claims 12 and 13 refer not to elevation angles of collection, but to the angles subtended at the illuminated spot by the aperture of the collector.

Claims 8, 18, 20 – 22, 27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over the '730 patent. The rejection is respectfully traversed.

All of the rejected claims depend from claim 1. For this reason, these claims are likewise believed to be allowable. These claims are also believed to be allowable on account of the limitations therein. Thus, claim 18 adds the limitation that the source comprises at least two optical fibers supplying the first and second beams. The Examiner deems such limitation to be “obvious to one having ordinary skill in the art at the time the invention was made to combine Vaez-Iravani et al (i.e., the '730 patent) with two optical fiber supply beams since it was well known in the art that using optical fiber supplies reduces cross-talk between the projected light, therefore increasing the sensitivity of the measurement.” The reason supplied by the Examiner does not support the combination of the '730 patent with two optical fibers. Since the two beams supplied appear to be spaced far apart, there appears to be no issue of cross-talk between them. Even if there is cross-talk between the two beams, this does not appear to adversely affect the detection scheme. Hence, the motivation or reason for the combination cited by the Examiner, even if valid, does not support the combination urged by the Examiner.

In the same vein, the limitation added by claim 20, namely that the fibers being single-mode fibers, is also unrelated to the reasons cited by the Examiner on preventing cross-talk between the fibers. Whether the optical fibers are single-mode or not is not related at all to the issue of preventing cross-talk between the fibers.

As for claim 29, once an ellipsoidal mirror is used as in the '730 patent for the collection of scattered radiation from the illuminated spot, it is not obvious at all how the optical head can be made to have dimensions not exceeding 5 cm. The Examiner has failed to demonstrate how this is possible. Thus, since the light scattered by anomalies to be detected is typically quite weak, in order to be effective as a collector of radiation, the ellipsoidal mirror used in the '730 patent must have a certain size in order to collect enough scattered radiation to make detection possible and practical. If the ellipsoidal mirror is made too small, the radiation collected may simply be too weak to be detectable. Given such an inherent limitation, we believe that it is not obvious to one having ordinary skill in the art at the time the invention was made to render the

device in the '730 patent to comply with the size requirements of 5 cm or smaller. The Examiner has provided no substantiation on how this is possible.

Claims 30 – 47 are rejected under 35 U.S.C. 102(e) as being anticipated by the '730 patent. The rejection is respectfully traversed.

For substantially the same reasons as those explained above in regard to claim 1, the '730 patent fails to anticipate claim 32. Furthermore, since the curved mirror appears to be an important element in the optical setup of the '730 patent, it is not obvious how this element can be eliminated. Therefore, claim 32 is believed to be allowable over the '730 patent.

Claims 33 – 47 are believed to be allowable since they depend from allowable claim 32. They are further believed to be allowable on account of the features added in these claims.

For example, claim 37 adds the limitation that the second beam is caused to be P-polarized and the detecting detects un-polarized radiation for detecting anomalies on smooth surfaces. This feature is not disclosed in column 11, lines 43 – 67 or anywhere else in the '730 patent, contrary to the opinion of the Examiner.

Claim 38 adds the limitation that the second beam is caused to be circularly polarized and the detecting detects un-polarized radiation for detecting anomalies on surfaces of dielectric layers. Column 11, lines 60 – 62, refers to a semi-circular shape of screens 236', 238', and not to any polarization state of the second beam. Thus, the section of the '730 patent relied on by the Examiner in regard to claim 38 does not support the rejection. This feature is not disclosed in column 11, lines 60-62 or anywhere else in the '730 patent, contrary to the opinion of the Examiner.

Claim 45 adds the limitation that the detecting comprises sampling of outputs of the detectors, and the determining determines anomalies on the surface from minimum or median values of the detector output samples. Column 12, lines 55 – 70 of the '730 patent relied on by the Examiner in rejecting claim 45 refers only to the minimum angular separation of the patterned scatter and not to any minimum values of detector output samples for identifying anomalies. Thus, the section of the '730 patent relied on by the Examiner in the rejection does not support the rejection of claim 45.

Claim 46 adds the limitation that the detecting detects by means of detectors that provide output signals and the detecting comprises sampling the output signals, and the determining determines anomalies on the surface from minimum or median values of the detector output

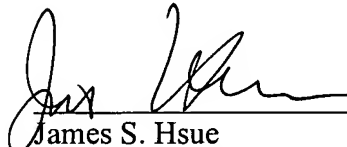
samples. Column 12, lines 37 – 62 described nothing more than the construction of spatial filters where all of the collected radiation is blocked except for a small angular aperture where the angle of the angular aperture is not larger than the minimum angular separation between pattern scatter. Thus, this section of the '730 patent fails to support the rejection of claim 46, contrary to the opinion of the Examiner.

New claims 48-94 have been added as indicated above. For substantially the same reasons as those above for claims 1-7, and 10-47, claims 48-94 are likewise believed to be allowable. Claims 1-7 and 10-94 are presently pending in this application.

CONCLUSION

In view of the amendments and remarks contained herein, it is believed that all claims are in condition for allowance and an indication of their allowance is requested. However, if the Examiner is aware of any additional matters that should be discussed, a call to the undersigned attorney at: (415) 318-1162 would be appreciated.

Respectfully submitted,


James S. Hsue
Reg. No. 29,545

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Date

PARSONS HSUE & DE RUNTZ LLP
595 Market Street, Suite 1900
San Francisco, CA 94105
(415) 318-1160 (main)
(415) 318-1162 (direct)
(415) 693-0194 (fax)